CLAIMS

What is claimed is

1) A barrier and Mid-IR optical window for a free space optical system comprising at least one frame member and at least one thin film, a first frame member forming a closed loop structure about a substantially open aperture further having a receiving bonding surface upon which a first thin film may be received and bonded whereby said first thin film is affixed to said first frame and extends over the open aperture to form a taught, substantially flat surface.

2) A barrier and Mid-IR optical window of claim 1,

said first frame further comprises a mechanical coupling means whereby said frame may be coupled to an optics head enclosure housing, and

said thin film is a polymer type material comprising molecules in a stressed state whereby polymer molecules are subject to a relaxing force which tends to pull the film taught in a shrinking action.

3) A barrier and Mid-IR optical window of claim 2, said thin film is bonded to said frame by an adhesive compatible with frame material and polymer material.

4) A barrier and Mid-IR optical window of claim 2, bond is plastic weld heat bond whereby these elements are joined together in a melting and fusing process.

5) A barrier and Mid-IR optical window of claim 2, said polymer molecules are stretched from their relaxed state and exert a force on the thin film whereby the thin film tends to be pulled into a plane.

6) A barrier and Mid-IR optical window of claim 2, said mechanical coupling means is a thread set complementary with an enclosure housing thread set.

7) A barrier and Mid-IR optical window of claim 2, said mechanical coupling means is a frame shape and size which cooperates with a receiving cavity of an enclosure housing whereby changing a window is a matter of simple manipulation of parts.

8) A barrier and Mid-IR optical window of claim 1, said window is comprised of two frames and two thin film members separated spatially be a body member.

9) A barrier and Mid-IR optical window of claim 2, further comprises condensation control means in spatial proximity to said thin film whereby condensation on the thin film is reduced.

10) A barrier and Mid-IR optical window of claim 9, said condensation control means is a desiccant reservoir.

11) A barrier and Mid-IR optical window of claim 9, said condensation control means is a heating element.

12) A barrier and Mid-IR optical window of claim 9, condensation control means is a dehumidifier in an optics head enclosure housing.

13) A barrier and Mid-IR optical window of claim 2, thickness of thin film is odd integer number of quarter wavelengths of a system design wavelength.

14) Methods of forming optical windows including:

providing a thin film polymer material highly uniform in thickness, said polymer being comprised of molecules held in a stretched or linearized state;

forming a closed loop frame of rigid material to provide a large area open aperture;

affixing said polymer material to said frame;

applying heat to said thin film polymer to encourage polymer molecules to return towards a relaxed state thereby pulling the material taught across said large area open aperture; and

removing heat and allowing said polymer material to set or freeze in a taught state thereby providing a highly uniform flat surface.

15) Methods of claim 14, where providing a thin film step includes providing a film of thickness which after application of heat shrinks to a thickness about an odd integer number of quarter wavelengths of a design pass wavelength.

16) Methods of claim 14, forming a closed loop frame includes forming a bonding surface in a plane of suitable area whereby a thin film may be affixed thereto in a secure bond.

17) Methods of claim 14, forming a closed loop frame includes forming a mechanical coupling integral with the frame whereby it may be coupled to a cooperating housing enclosure and is removable therefrom.

18) Methods of claim 14, said affixing step is applying an adhesive material between frame and thin film and allowing it to cure.

19) Methods of claim 14, said affixing step is a heat bonding step whereby the plastic material of the thin film is fused with the material from which forms the frame in a plastic weld.

20) Methods of claim 14, said providing a thin film is forming a film of calculated uniform thickness in view of shrinking properties whereby after heating step the material is odd integral of quarter wavelengths

21) Methods of claim 14, further comprising a process step to reduce provide a condensation reduction means.